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ABSTRACT

A model for evaluating educational products is presented which is based on a simple philosophy: decide in advance what the final product ought to look like; then use this conception to prescribe methods for developing and measuring it. In the preordinate model, five separate activities are identified which occur in approximately the following order: (1) selection of the product, (2) selection of the critical properties of the product, (3) making critical properties as operational as possible, (4) using critical properties to describe materials and developmental procedures or instruction, and (5) using critical properties to prescribe evaluation. Assumptions underlying the preordinate model are uncovered, and strengths and weaknesses of the model are reviewed. Several steps for enriching the model are then prescribed. (RC)

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Preordinate Models of Product Development: Implications for Alternative Approaches to Evaluation (Or, How to End Up Undernourished)

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The model I should like to describe and talk about is certainly not new. At least in a general form it can be observed throughout the history of American education with formal articulation as early as Tyler's work in the thirties. Stripped of its eruditic fluffiness, the model--or at least the philosophy behind it--is nicely simple: Decide in advance what the final product ought to look like then use this conception to prescribe methods for developing and measuring it. Although our thinking about the model has become more sophisticated and refined, the basic orientation remains: Define in advance, then prescribe.

What about the word "Product" used in the title? Let us consider it in the broadest possible sense in order to apply the model most widely. A "product" can be some desired behavior of a student, an altered attitude on the part of the teacher, an artistic creation of a second grader, a functional team teaching arrangement, more effective communication among administrators, or any other desired outcome.

I have chosen to describe the model operationally as it seems to appear on the educational scene. Here, it is messy and inelegant but faithfully realistic and repeatable. Here also we can most vividly observe its assumptions, strengths, and weaknesses.

Description of the Model

In the preordinate model, about five separate activities can be identified which occur in approximately the following order:

1. Selection of the product. Almost without exception, educators using this model decide upon the product to be developed as an initial activity. A product within the school setting is selected on the basis of school philosophy, the board's recommendation, teacher interest, assessed needs or

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more typically, a combination of these. Unfortunately, the evaluator is seldom invited to participate in this initial activity. Decisions about what product will be selected, along with its worthiness, are made almost entirely by administrators and teachers within the system. To illustrate the model as it is described, suppose that persons in a certain school district, acting upon the results of a needs assessment survey, select the product "Open concept classroom" as part of an individualizing effort at the elementary level.

2. Selecting the critical properties of the product. This is in reality a defining activity in which the product is brought into existence by a description of its critical properties or attributes. These allow us to differentiate among products and also to determine when a product has in fact been developed. Here the teachers begin to ask, "What are the defining properties of this product?" Or, in other terms, "What are the characteristics of an open classroom?" Obviously, a product can be assigned different sets of critical properties by different groups of people. Also--and this is important--the critical properties of a product can and do change; over time, over age groups, across socio-economic levels, and so forth.

Using our illustration, an "Open concept classroom" might be one in which:

a. The students feel free.
b. Each student can select and study any topic of his choice.
c. The amount of time the teacher addresses the class as a unit is less than five percent.
d. Visitors or non class members can come and go without disrupting what individuals within the class are doing.
e. There are no permanent partitions.

In times past, educationists have called in the evaluator to assist in the selection of critical properties. More recently, however, they have felt comfortable conducting this task by themselves.

3. Making critical properties as operational as possible. In many cases, critical properties are selected which are operational or, stated differently, which are measurable. Indeed, the major criterion for selecting a critical property has unfortunately been its measurability. But this need not nor should be the case. Important critical properties can and ought to be selected regardless of their measurability. For this reason activity two (selecting critical properties) has been separated from activity three (making them as operational as possible).

Typically, it is at this stage that the evaluator enters the picture. Sitting down with the educationist he recasts a critical property here, makes modifications there, adds one, omits another. But, he is not allowed considerable freedom in this endeavor. Rework to make more measurable is his theme. Value judgments about the worthiness of this or that critical property are generally thought to be outside his role as evaluator.

Following through with our example, the evaluator might look at the critical property "The students feel free" and decide to sharpen it to "There is no restriction on physical movement or verbalizations of any student within the classroom. Likewise, there is no restriction on who enters or leaves the room."

4. Using critical properties to prescribe materials and developmental procedures or instruction. When the product is a learned behavior on the part of the student, the educationist might ask, "What do these critical properties suggest in the way of learning experiences, materials to be selected, teaching strategies, and sequencing?" The more specific the critical properties, the greater their prescriptive power, and the narrower the range of potential materials and experiences. Since educationists have been traditionally strong in planning the "curriculum" they, more than anyone else, engage in this activity.

In our example, the critical properties suggest a variety

of development activities: Construct a room in which all partitions or screens are movable; develop a wide variety of resources which can be used by individual students and which will not compete with each other; help teachers develop instruction so they will not have to meet with the class as an entire unit more than five percent of the time; encourage outsiders to spend time in the room and make adjustments to reduce their interference.

5. Using critical properties to prescribe evaluation. While the educationist is busily generating curricula or development procedures, the evaluator has been assigned the task of constructing an evaluation program. He, too, studies the critical properties but asks a different type of question: "How can I most directly and validly measure the attainment of this product?" Or, more precisely, "How can I measure attainment of the critical properties which we are using as evidence for the product?" Unfortunately, the evaluator is too often given sole responsibility for this activity.

Initially, he searches for already developed instruments which can provide valid measurements of the critical properties. More specifically, he looks for those that call forth the same characteristics identified in the critical properties. But, because critical properties are usually very specific, currently available instruments are found to be overly inclusive in their measurements. The remaining option is to construct instruments custom tailored to these particular critical properties. Indeed, as the properties become more and more specific, they become the evaluation instrument.

Of all psychometric properties then, content (logical) validity becomes paramount in the development of evaluation within a preordinate model. If the product is a general skill on the part of the student, the conscientious evaluator will construct some sort of general evaluation plan and table of specifications in order to build validity into his measurements. The former device aids in obtaining instruments which call forth essentially the same behaviors as those identified by the

critical properties; the latter insures adequate sampling of these behaviors and the topics at which they are directed.

How might the critical properties in our example prescribe an evaluation program? Recall that the first critical property was sharpened into the following: "There is no restriction on physical movement or verbalizations of any student within the classroom. Likewise, there is no restriction on who enters or leaves the room." What is a direct and valid measurement of this critical property? An observational instrument such as a rating scale could be used to identify the behavior "degree of restriction." A sample of randomly selected students could be unobtrusively observed over a period of time. Additionally, we might ask each student to respond on paper or in an interview to questions about his degree of restriction. Further, a tape recorder would capture the verbalizations of these students and after constructing a judgment scale, utterances could be analyzed in terms of degree of restrictiveness.

Similar kinds of procedures could be followed in developing evaluation instruments for the other critical properties. The important point here is that when criticial properties are specific and operational, development of measurements with high content validity is rather straightforward and not overly difficult.

Finally, after gathering and processing his data, the evaluator prematurely ends his involvement by turning over results to the educationist who is now left with the crucial task of interpretating and recommending.

Assumptions Underlying the Model

In order to think more exhaustively about the strengths and weaknesses of the preordinate model, it should be helpful to uncover a few assumptions made by those who use this model:

1. High quality critical properties can be identified prior to the product's development.
2. The critical properties of a product remain relatively constant over a period of time and over a variety of contexts.

3. The critical properties chosen are representative of all critical properties that could have been selected.
4. The measurability of a property is an important criterion for selecting it as critical.
5. Content validity is the most important psychometric characteristic of a set of measures.
6. Evaluation should be limited to those critical properties that have been predetermined.

Strengths of the Model

1. The model is simple, internally consistent and enjoys wide applicability.
2. The model is heavily presciptive. Once the critical properties of a product have been clearly identified, development and evaluation are effectively facilitated.
3. The model stresses isomorphism among its components. At its most reductive level there is virtually a one-to-one correspondence between critical properties and evaluation. Suppose, for example, the reductive critical property "being able to add 2 plus 2 and arrive at 4." Evaluation consists of nothing more than asking the student to add 2 plus 2. Although reducing critical properties to such an extreme is usally undesirable, the notion of tying evaluation closely to critical properties is basically a sound one. Stated in more familiar language, we still want an instrument to measure what it is supposed to measure.

Weaknesses of the Model

1. The model, in restricting evaluation, trades off richness for precision.
2. The model--or those of us who have used it--lacks the sophistication demanded by the complex process of educability. The model is at its best with simple products developed through simple means. The overall process of educability involves too many changes, too much subtlety, too much learner variability, too much incidental learning to be completely accommodated by a set of such simplistic activities.

3. Since critical properties prescribe evaluation, the quality of evaluation can be no higher than the quality of the critical properties, the latter of which is typically low.
4. Neither educationist nor evaluator is presently skillful enough to predetermine an optimal and complete set of critical properties for a product.
5. The model is unnecessarily rigid in limiting itself to only those critical properties which have been predetermined.

Enriching the Model

1. The preordinate nature of the model ought not to be lost but there is a need to become more tentative, less rigid. Preidentified critical properties should be honest prototypes of later refinements.
2. The prescriptive power of the model ought not be lost but it needs to be counterbalanced by a legitimate feedback function. Just as established critical properties prescribe evaluation, evaluation should turn around and provide new critical properties, or at least modifications of existing ones.
3. Critical properties ought not be over defined. They should be left at a heuristic level; one that will evoke other critical properties thus providing a more complete definition of the product.
4. Evaluation ought to be more complete, varied, and exhaustive. Not only should we gather data on predefined critical properties but on any aspect of the product or its development which might be helpful in making later decisions. Such an orientation ushers the evaluator into a more versatile role... he progresses from a scientist into a craftsman. A craftsman is no less scientific. He is, rather, more skillful in applying the tools of his trade to a wider range of problems. And, if his bag fails to contain an appropriate tool, he possesses the ability and good sense to create a new one. Likewise, he is uncommonly flexible in his trade. He can observe both carefully and crudely. He can gather data both

systematically and unsystematically; he can be intentional or anecdotal; he uses experimental designs as well as descriptive surveys; he can call on multivariate analysis as well as frequency counts. His earmark as a true craftsman, then, comes in his ability to gather the richest data for the problem at hand.